Data Structure Report of Small-Scale Sampling of a Mesolithic Shell Midden at Tràigh na Beirigh, Cnip, Lewis, 2011

Project Summary

National Grid Reference	NB 1002 3628
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Schedule	September 2011
Sponsors	National Science Foundation of America (grant number 0732327), Historic Scotland, Durham University

View of the Mesolithic shell midden located on a rocky headland at Tràigh na Beirigh, looking north-east.

Contents

Summary

The wider research project investigating the Mesolithic of the Western Isles of Scotland (the 'Outer Hebrides') undertaken by Durham University has identified the second Mesolithic site in this region: a shell midden at Tràigh na Beirigh, Cnip, Lewis. Due to the international research significance of this site and its imminent destruction by coastal erosion, a full coastal erosion assessment of the site was undertaken in September 2011 by a team from Durham University led by Dr. Mike Church. No archaeological structural features were identified, but initial sample processing has produced a large assemblage of environmental and non-environmental remains. It is proposed that the Mesolithic shell midden at Tràigh na Beirigh comprises primarily the food waste and fuel remnants leftover from a few short-term, perhaps seasonal, visits of hunter-gatherers to this locale, and rests upon an in situ old ground surface that overlies sterile wind-blown sand. Future work will involve full excavation of the site and a detailed radiocarbon dating programme.

1.0 Introduction

The first evidence for a Mesolithic human presence in the Western Isles of Scotland was discovered in 2001 at Northton, Toe Head Peninsula, Harris (NGR: NF 975 912; Gregory et al. 2005; Simpson et al. 2006). Further small-scale excavation at Northton was conducted in 2010 within a wider research project investigating the Mesolithic of this region undertaken by Durham University (Bishop et al. 2010; 2011). Radiocarbon dating of a small number of carbonised hazel nutshells has produced calibrated dates for Mesolithic human activity at Northton ranging from 7060 to 6090 cal BC (Gregory et al. 2005: 945), or the earlier centuries of the Late Mesolithic of Scotland (cf. Ashmore 2004: 92). The site is currently interpreted as a buried land surface that incorporates a palimpsest of disturbed and bioturbated hearth deposits containing fuel remnants and food waste (Bishop et al. 2010; 2011). The subsequent objective of this research project was the discovery and targeted excavation and sampling of further Mesolithic sites in this region.

The discovery of the second Mesolithic site in the Western Isles occurred in 2010/2011. In 2010, a small sample (two litres) was taken from the eroding section of the main body of a previously identified open air, aceramic shell midden on the beach of Tràigh na Beirigh, Cnip, Lewis (Figure 1, 2 and 3; NGR: NB 1002 3628). The shell midden was first revealed

by coastal erosion in the 1990's (Armit 1994: 67, 90), and recorded further during a coastal erosion assessment of Lewis in 1996 (Burgess & Church 1997: 117). This sample was taken for radiocarbon dating because it was thought that the site may date to the Mesolithic given that the base of the midden grades into a possible early to mid-Holocene soil in a similar fashion to the Mesolithic site at Northton (Church et al. *in press*).

This sample was processed and found to contain hundreds of marine molluscs and fish bones (Blake 2011), a small number of crustacean fragments (Blake 2011), hare bones, carbonised hazel nutshell fragments and charcoal. No lithics were recovered, nor any evidence of domestic animal or plant species, or pottery. Radiocarbon dating of a small number of the carbonised hazel nutshells has produced calibrated radiocarbon dates for the development of the shell midden, as yet unpublished, spanning from *c* 4400 to *c* 4000 cal BC, or the Terminal Mesolithic of Scotland (cf. Ashmore 2004: 92).

The shell midden at Tràigh na Beirigh is therefore the second radiocarbon-dated Mesolithic site in the Western Isles and the only site of its type in the archipelago. This fact, together with the site's excellent faunal and floral preservation, makes it of considerable international research significance. Unfortunately, the shell midden is rapidly being destroyed by extremely active coastal erosion as a consequence of its highly exposed location (Figure 4). In fact, very little of the shell midden now remains. Therefore, a full coastal erosion assessment of the shell midden was considered essential before it is completely lost.

1.1 Research Aims

The coastal erosion assessment conducted had four research aims. These were:

1. To assess the extent of coastal erosion of the site.
2. To establish the nature and extent of the Mesolithic deposits.
3. To undertake detailed sampling and analysis of the archaeobotanical, zooarchaeological and non-environmental remains recovered from the eroding Mesolithic deposits.
4. To consolidate the site by creating a contoured gravel and turf layer over the eroding edge of the shell midden.

2.0 Methods

2.1 Coastal Erosion Assessment

A detailed survey of the site and its immediate environment was undertaken using a geo-referenced Topcon Positioning System (Figure 5). The state of the shell midden prior to coastal erosion assessment was recorded using digital photography (Figure 6). The eroding face of the midden was divided into five sections (Figure 7): A-B (Figure 8), B-C (Figure 9), C-D (Figure 10) and D-E (Figure 11). Section B-C was interrupted by a quartz seam. On the north-west and south-east side of the quartz seam respectively, this section was further divided into B-B^1 and B^{2-}C. The shell midden deposits of section B-C had almost completely eroded away. Thus, only sections A-B, C-D and D-E were sampled. These sections were cleaned back by 10cm parallel to the eroding edge. This enabled a sizeable sample (>50 litres) to be obtained, and clean sections to be revealed. The contexts and stratigraphy of these sections were then described, drawn and photographed. To determine the extent of the shell midden deposits, two test-pits were excavated on the overburden behind the main eroding section of the shell midden: section C-D, on the final area of level ground before the overburden slopes downwards towards the sea. Each test-pit was located in line with each end of this section (Figure 7).

All excavation was undertaken by hand, using standard archaeological excavation methods and a single context recording system. The location of finds was recorded in three dimensions relative to the relevant section. All quartz, worked and unworked, was retained for specialist analysis, following Ballin (2009: 90). Plans and sections were drawn at 1:10. Only digital photographs were taken (Table 1). When cleaning back the eroding edge of the shell midden, a 100% sampling strategy of all archaeological deposits was employed (Jones 1991). This was deemed the most appropriate sampling strategy given the international research significance of the shell midden and its inevitable loss to coastal erosion.

After the coastal erosion assessment, the remaining shell midden was consolidated through the construction of a contoured gravel and turf layer over its eroding edge (Figure 12). This layer should stabilise the eroding edge for the winter but will not be able to protect the shell midden from its inevitable complete destruction by coastal erosion in advance of any major storms in the immediate future.

2.2 Sample Processing

All samples were wet-sieved in the Environmental Processing Laboratory in the Department of Archaeology at Durham University, with the residue captured by a 1mm sieve and the flot by a 1.0mm and 0.3mm sieve. The residues were then oven-dried. The >4mm sieved fraction of the residues will be sorted by eye, while the >2mm and >1mm sieved fractions will be sorted under a low-powered binocular microscope, with all bone fragments collected, to ensure comprehensive recovery (Wheeler & Jones 1989: 50, 59). Comprehensive recovery of the faunal and floral remains was considered vital considering the scarcity of sizeable Mesolithic faunal (McCormick & Buckland 1997; Kitchener et al. 2004) and floral (Bishop et al. 2011) assemblages in Scotland, and indeed, Britain as a whole. The material recovered from the residues and floating fractions will be incorporated into the relevant sieved fraction, ready for specialist analysis.

Dr. Mike Church is responsible for supervising the specialist analysis of this material. Several MSc students from the Department of Archaeology at Durham University will analyse the archaeobotanical remains and charcoal as part of their supervised summative coursework. Emily Blake will analyse the fish, marine mollusc and crustacean remains as part of her supervised DDS (Durham Doctoral Studentship) funded PhD research. Stephanie Piper will analyse the artefactual material as part of her planned future PhD research. Prof. Peter Rowley-Conwy and Angela Perri will analyse the zooarchaeological remains. Dr. Mike Church will undertake routine soil tests of the samples. Matthew Law (University of Cardiff) will analyse the land snails as part of his supervised PhD research.

3.0 Results

3.1 Erosion

Upon arrival at the site, it was immediately apparent that much of the shell midden had already eroded away, based upon the sheer quantity of shell which lay on the ground adjacent to it (Figure 6). Shell midden deposits were not encountered in either of the test-pits, indicating that very little of the shell midden now remains (See Section 3.2.2 and 3.2.3): total excavation of the shell midden in the future is required to determine its precise extent. Due to the highly exposed location of the site to the prevailing winds of the North Atlantic (Figure

4), it is expected that it will be completely destroyed by coastal erosion within the next few years.

3.2 Stratigraphy

Drawings and photographs of sections A-B, C-D and D-E post-excavation are provided in Figure 13 to 17. Details of all contexts, drawings, small-finds and samples, are provided in Tables 2, 3, 4 and 5 respectively. The Harris Matrix is located in Figure 18.

3.2.1 Eroding Face of the Shell Midden

The eroding face of the shell midden is overlain by turf. Beneath the turf and above the shell midden deposits lay two equivalent contexts which consisted of dark brown organic silty sand with some shell inclusions: context 004 in section A-B and context 005 in section C-E. These contexts are interpreted as a mixed interface horizon between the top of the shell midden and the overlying turf. A discrete patch of shell, termed context 012, lay within the portion of C005 revealed in section D-E. This context was shell-supported with some sandy silt inclusions, and may represent a single episode of discard. The presence of turf directly above these contexts indicates that there was a stratigraphic discontinuity in the sequence and that the later prehistoric and historic layers had been removed by a recent erosion event.

A series of undisturbed in situ Mesolithic layers were discovered beneath C004, C005 and C012. The main body of the shell midden lay directly beneath them, comprised of two equivalent contexts: context 009 in section A-B (Figure 19) and context 008 in section C-E (Figure 20). These contexts were shell-supported with some dark brown/black sandy silt inclusions. Two small finds (SF1 and SF2) were discovered in C008: a struck quartz lithic and possible hammer-marked stone respectively. The anthropogenic origin of these deposits is evidenced by the inclusion of worked lithics, as well as burnt material such as hazel nutshell and fish bone. C008 and C009 are thus interpreted as representative of the main period of human activity at this locale, most likely in the form of food waste and fuel remnants leftover from a few short-term, perhaps seasonal visits. A discrete shell layer, termed context 011, lay underneath C008 in section C-D. This context was shell-supported with some black/dark brown sandy silt inclusions, and was comprised of mainly razor clams (*Ensis* sp.) which were layered very clearly (Figure 21). This context could represent a single episode of anthropogenic discard. Underneath C011 lay context 013, a shell-supported context containing a greater proportion of soil (dark brown/black sandy silt) than the

preceding shell midden contexts (C008, C009, and C011) (Figure 21). This context is interpreted as the basal layer of the shell midden between section points C and D. Radiocarbon dating of a small number of the carbonised hazel nutshells recovered from the two litre sample taken through the entire thickness of the eroding section of the shell midden between section points C and D (C008, C011 and C013 combined) in 2010 (termed context 001), has produced calibrated radiocarbon dates for the development of the shell midden, as yet unpublished, spanning from *c* 4400 to *c* 4000 cal BC.

An in situ old ground surface was identified underneath C009 in section A-B and C013 in section C-E, with little mixing between the old ground surface and these overlying contexts. The old ground surface was comprised of contexts 014 and 015 in sections C-E and A-B respectively, both of which are equivalent (Figure 22). These contexts consisted of black sandy clayey silt with sporadic charcoal, shell and angular/sub-rounded stone (<10cm long) inclusions. A possible hammer-marked stone (SF3) was identified in C014. The presence of charcoal and worked lithics demonstrates the occurrence of anthropogenic discard into these deposits, and thus, the occurrence of pre-shell midden human activity at this locale. While these contexts have not yet been directly dated, they must predate the development of the shell midden given their stratigraphic position, and therefore, may be older than *c* 4400 cal BC. Two carbonised hazel nutshells will be sent to SUERC from this layer for AMS radiocarbon dating.

Beneath this old ground surface (C014 and C015) lay a grey/orangey brown, inorganic sand layer comprised of context 017 in section A-B (Figure 23) and context 016 in section C-E (Figure 24), both of which are equivalent. There was little grading between the old ground surface and these immediately underlying contexts. These contexts contained occasional shell and charcoal inclusions, especially towards the top of C016 in section C-D where a patch of increased shell and organics was identified (Figure 17). This patch also contained two small finds: a possible worked lithic (SF4) and a lump of quartz (SF5). The apparent 'concentration' of anthropogenic material, such as charcoal and worked lithics, towards the upper part of C016 and C017, followed by largely sterile, wind-blown sand in the lower part of these contexts, is interpreted as representative of the gradual development of human activity at this locale sometime before *c* 4400 cal BC. These contexts have not yet been directly dated. C016 and C017 sit directly upon bedrock. The absence of glacial till between the bedrock and sand indicates that there was a stratigraphic discontinuity in the sequence and

that the original glacial till deposits had been removed by an early to mid-Holocene erosion event.

None of the deposits excavated in sections A-B, C-D and D-E contained positive or negative features.

3.2.2 Test-Pit 1

The deposits of test-pit 1 are overlain by turf, termed Context 003. Beneath the turf lay context 006, a dark brown sandy soil with very few shell inclusions. Underlying C006 was context 007, the glacial till, which was a light brown/orangey soil. The till sat directly upon bedrock (Figure 25). The shell midden deposits identified in sections A-B, C-D and D-E were not identified in this test-pit, indicating that they do not extend this far to the north-east of the main eroding section of the shell midden: section C-D.

3.2.3 Test-Pit 2

The deposits of test-pit 1 are overlain by turf (C003). Beneath the turf lay C006, followed by context 010, a sterile, very dark brown sandy soil. C010 grades down to the glacial till (C007), which rests upon bedrock (Figure 26). As with test-pit 1, the shell midden deposits identified in sections A-B, C-D and D-E were not identified in this test-pit. This indicates that they do not extend this far to the south-east of the main eroding section of the shell midden: section C-D.

None of the deposits excavated in test-pits 1 and 2 contained positive or negative features. All of the test-pit contexts are as yet undated.

Until the entire shell midden is excavated, it is unknown how the contexts revealed in the eroding face of the shell midden and test-pits 1 and 2 relate to each-other.

3.3 Preliminary Interpretation

It is proposed that the Mesolithic shell midden at Tràigh na Beirigh comprises of the food waste and fuel remnants leftover from a few short-term, perhaps seasonal, visits of hunter-gatherers to this locale, and rests upon an in situ old ground surface that contains frequent ecofacts and artefacts stemming from anthropogenic discard.

4.0 Future Work

Additional funding is being sought to complete research at the site. Future research will include:

1. Full excavation of the shell midden and underlying archaeology before both are completely lost to coastal erosion, to obtain further samples for detailed environmental and non-environmental analysis and to allow further investigation of the nature and extent of the Mesolithic deposits.
2. A detailed radiocarbon dating programme, involving dating of the old ground surface and the successive shell midden contexts identified during this coastal erosion assessment, to produce a more detailed understanding of the temporality of Mesolithic hunter-gatherer activity at this locale.

5.0 Acknowledgments

We would like to thank the following people for permission to excavate at Tràigh na Beirigh: the Bhaltos Community Trust and Iain McKenzie (Clerk of the Grazing Committee) for permission to excavate the site. We would also like to thank members of the local community who helped us with the project, especially Sarah Egan for logistical assistance and varied discussions, and Deborah Anderson (Regional Archaeologist). We would also like to thank the following bodies for providing funding for this research: National Science Foundation of America (grant number 0732327), Historic Scotland, and Durham University. Finally, we would like to thank the excavation team for their work on the site: Prof. Peter Rowley-Conwy, Stephanie Piper, Angela Perri and Rosie Bishop.

6.0 References

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7.0 Figures

Figure 1: Site location (Top right: after Gregory et al. (2005: 945); Bottom: after Armit (1994)

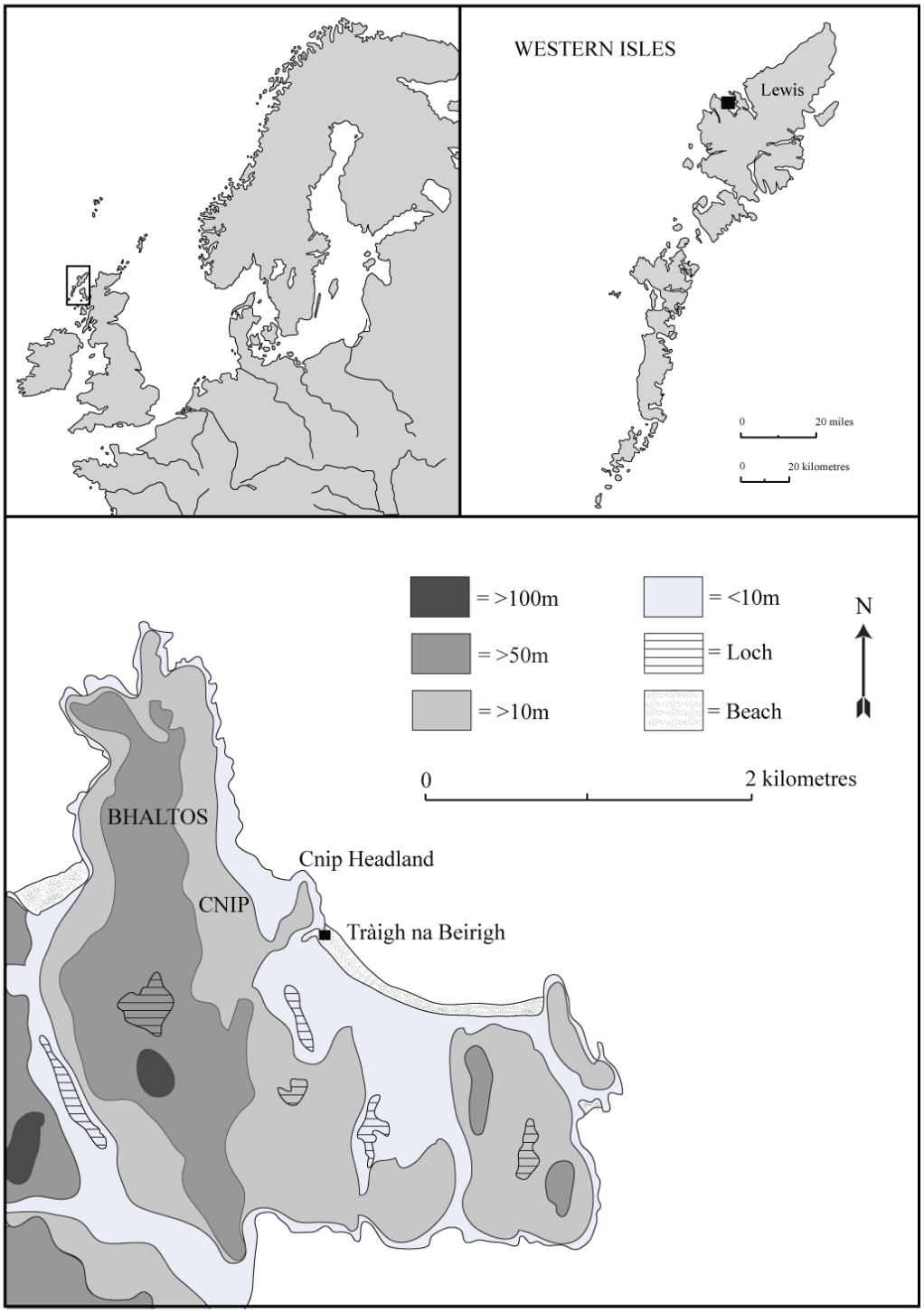

Figure 2: Aerial view of Tràigh na Beirigh with approximate location of shell midden, looking north-east (After photograph of S. Angus from May and Hansom, 2003)

Figure 3: Immediate context of site with its exact location highlighted, looking north

Figure 4: Site location in relation to the sea, looking south-east

Figure 5: Survey plan for Tràigh na Beirigh 2011

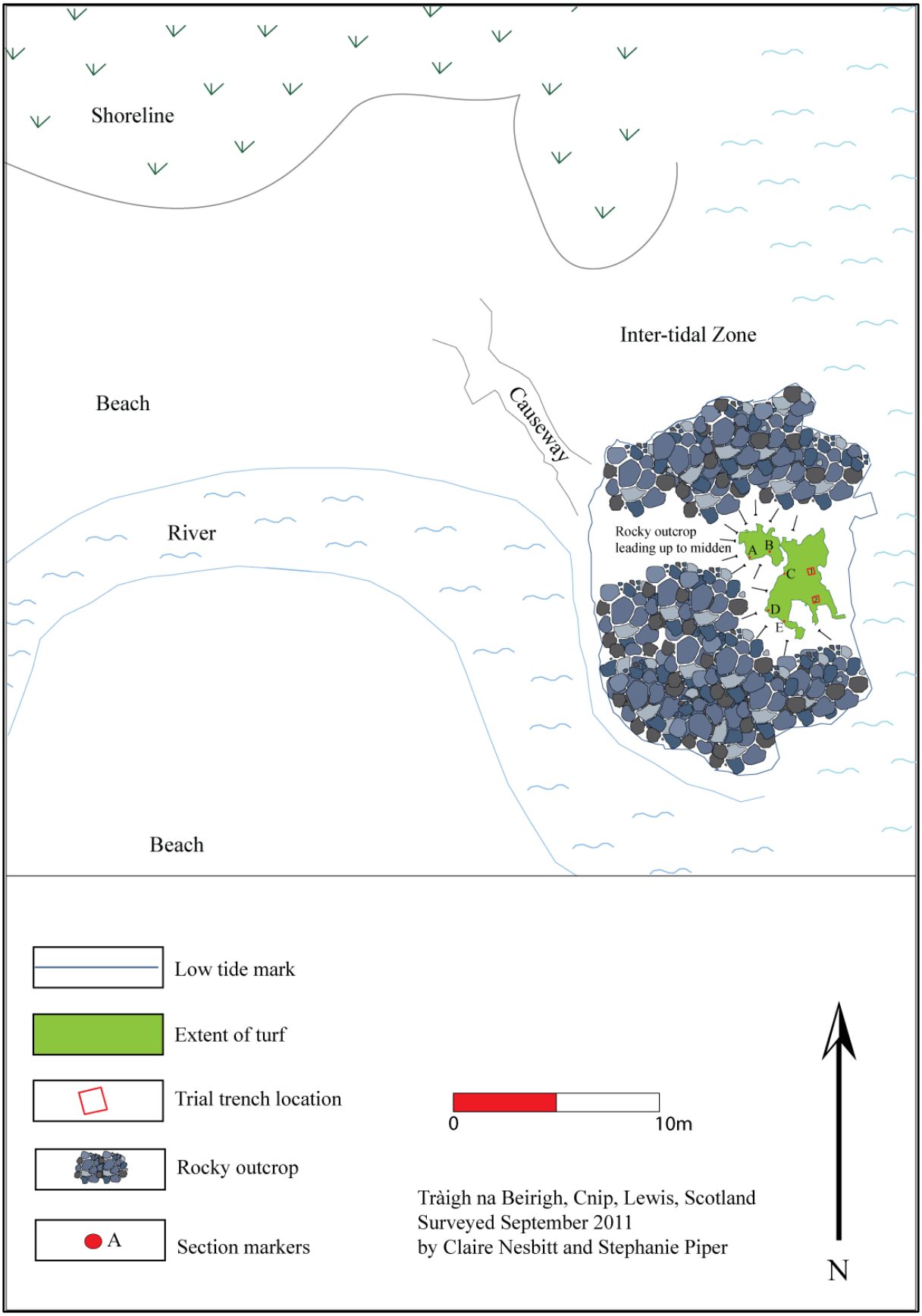

Figure 6: Eroding Mesolithic deposits, looking north-east

Figure 7: Detailed survey plan for Tràigh na Beirigh 2011 showing location of section points and test-pits

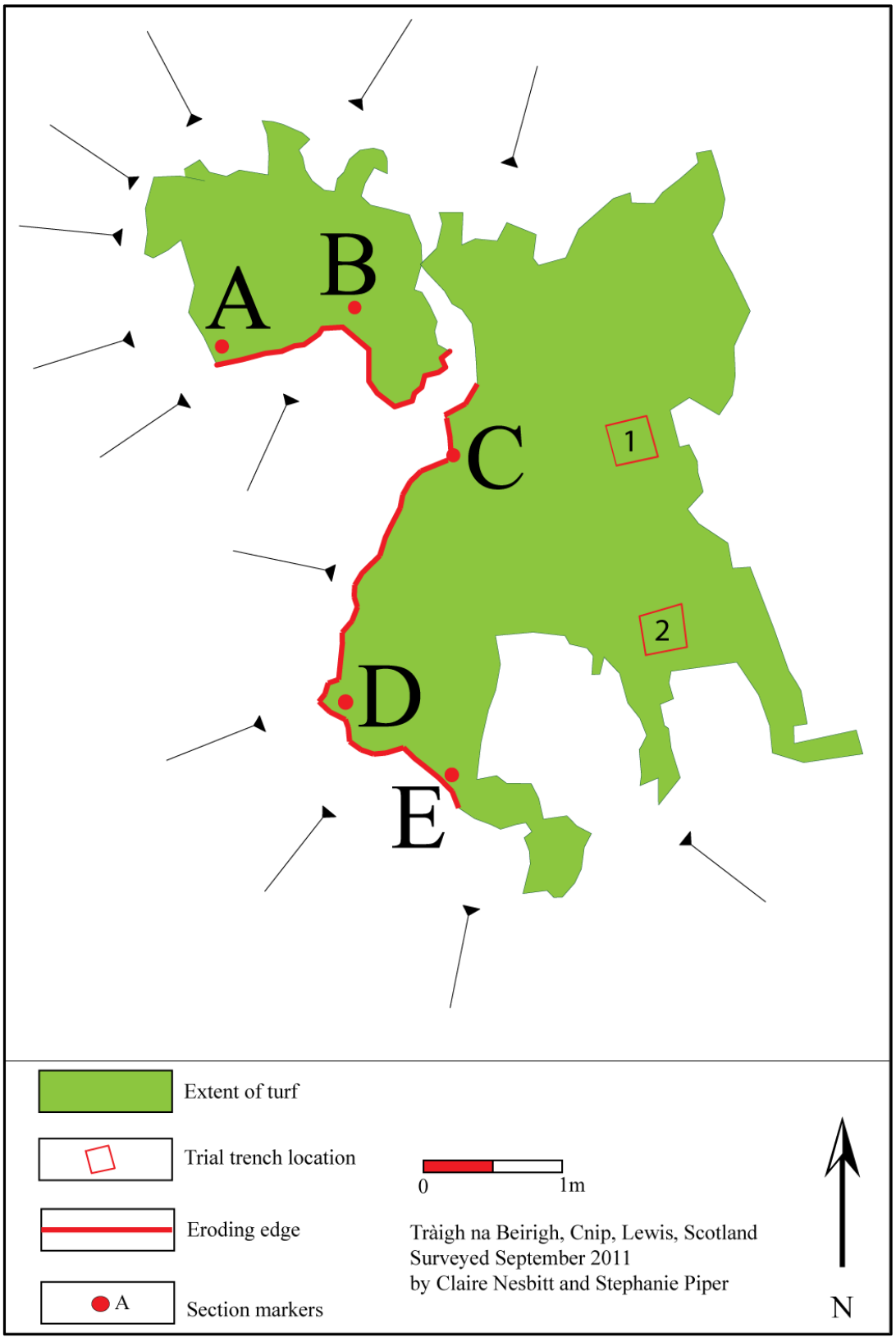

Figure 8: Section A-B pre-excavation, looking north

Figure 9: Section B-C pre-excavation, looking north-east

Figure 10: Section C-D pre-excavation, looking south-east

Figure 11: Section D-E pre-excavation, looking north

Figure 12: Site following reinstatement, looking north-east

Figure 13: Section A-B post-excavation, looking north

Figure 14: Section A-B (Key: Grey figure = stone/rock)

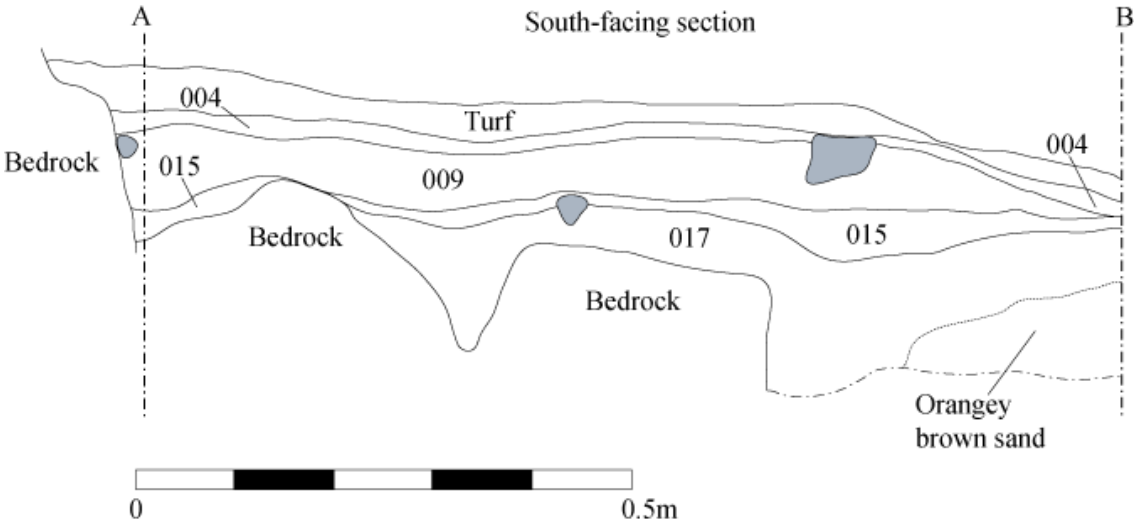

Figure 15: Section C-D post-excavation, looking south-east

Figure 16: Section D-E post-excavation, looking north

Figure 17: Section C-D and D-E (Key: Grey figure = stone/rock)

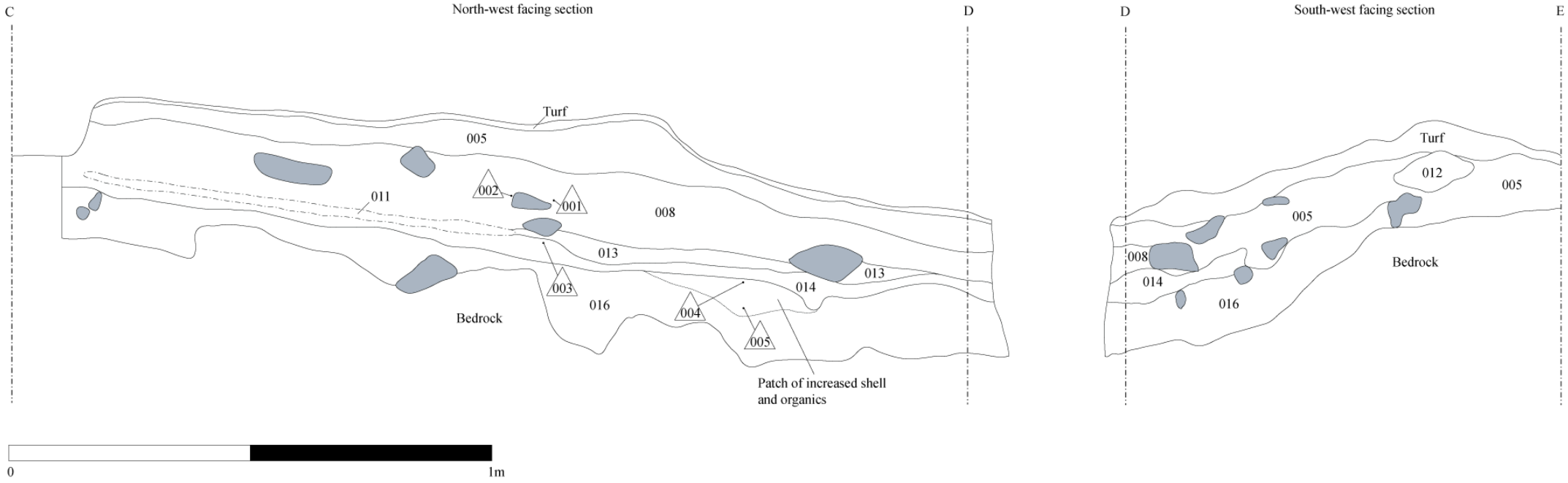

Figure 18: Harris Matrix for Tràigh na Beirigh 2011

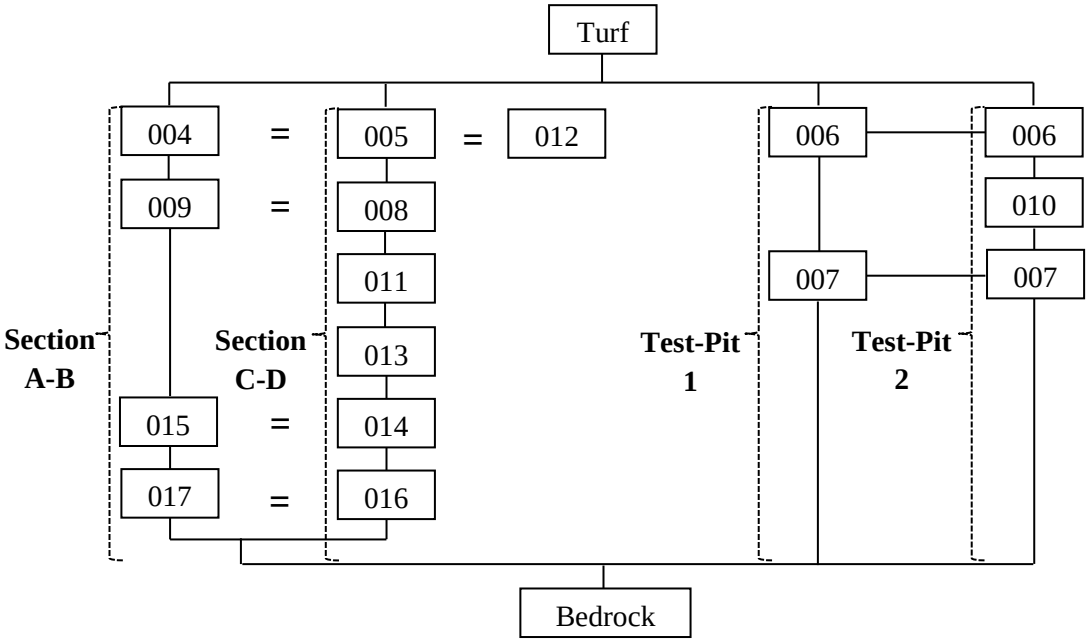

Figure 19: Context 009 in section A-B pre-excavation, looking north

Figure 20: Context 008 in section C-D pre-excavation, looking south-east

Figure 21: Contexts 011 and 013 in section C-D pre-excavation, looking south-east

Figure 22: Context 014 in section C-D pre-excavation, looking south-east

Figure 23: Context 017 in section A-B pre-excavation, looking north

Figure 24: Context 016 in section C-D pre-excavation, looking south-east

Figure 25: Test-Pit 1, excavated down to bedrock

Figure 26: Test-pit 2, excavated down to bedrock

8.0 Tables

Table 1: Tràigh na Beirigh 2011 digital photo list

Digital shot number	Description
TNB11 DP 1-6	Pre-excavation shot looking NE.
TNB11 DP 7-15	Pre-excavation shot looking NW.
TNB11 DP 16-19	Pre-excavation shot looking SE.
TNB11 DP 20-22	Pre-excavation shot looking south.
TNB11 DP 23-25	Pre-excavation shot of A-B: south-facing section, looking north.
TNB11 DP 26-28	Pre-excavation shot of B-C looking NE.
TNB11 DP 29-32	Pre-excavation shot of D-E: south-facing section, looking north.
TNB11 DP 33-42	Pre-excavation shot of C-D: NW facing section, looking SE.
TNB11 DP 43-45	Test-pit 1 bottomed.
TNB11 DP 46-49	Pre-excavation shot of C008: NW facing section, looking SE.
TNB11 DP 50-55	Working shots.
TNB11 DP 56-58	Pre-excavation shot of C009: south-facing section, looking north.
TNB11 DP 59-61	Test-pit 2 bottomed.
TNB11 DP 62-64	Pre-excavation shot of C013 and C011: NW facing section, looking SE.
TNB11 DP 65-67	Pre-excavation shot of C014: NW facing section, looking SE.
TNB11 DP 68-71	Pre-excavation shot of C016. NW facing section, looking SE.
TNB11 DP 72-74	Pre-excavation shot of C017: south facing section, looking north.
TNB11 DP 75-77	Post-excavation shot of C-D: NW facing section, looking SE.
TNB11 DP 78-89	Post-excavation shot of A-B: south-facing section, looking north.
TNB11 DP 90-98	Post-excavation shot of C-D: NW facing section, looking SE.
TNB11 DP 99-102	Post-excavation shot of D-E: south-facing section, looking north.
TNB11 DP 103-110	General shots of site location.
TNB11 DP 111-113	Post-excavation shot of B-C looking NE.
TNB11 DP 114-115	Re-instated site from SW looking NE.

Table 2: Tràigh na Beirigh 2011 context list

Context number	Description
001	2011 shell midden deposits (C008, C011 and C013) in C-D, underlying C005 and overlying C014. Two litre bulk sample produced two calibrated radiocarbon dates of terminal Mesolithic age (*c* 4400 to *c* 4000 cal BC).
002	Cleaning context of eroding section area (A-E) underlying turf.
003	Turf with heavy root mat in test-pits 1 and 2, overlying C006.
004	Dark brown silty, mixed interface context with shell *inclusions* between turf and top of shell midden (C009) in A-B. Same as C005.
005	Dark brown silty, mixed interface context with shell inclusions between turf and top of shell midden (C008) in C-E. Same as C.4.
006	Dark brown sandy soil with very few shell inclusions, underlying turf (C003) and overlying C007 in test-pits 1 and 2.
007	Till (light brown/orangey soil) underlying C.6 and overlying bedrock in test-pits 1 and 2.
008	Main body of shell midden (shell supported with some sandy silty soil inclusions) from C-E. Same as C009.
009	Main body of shell midden (shell supported with some sandy silty soil inclusions) from A-B, underlying C004 and overlying C015. Same as C008.
010	Sterile, very dark brown sandy soil underlying C006 and overlying C007 (grades into this context) in test-pit 2
011	Discrete shell layer with some black/dark brown sandy silt inclusions, underlying main body of shell midden (C008) and overlying C013 in C-D. Layered very clearly and mostly comprised of razor clams (*Ensis* sp.).
012	Discrete patch of shell with sandy silty inclusions, underlying C005 and overlying C016 in D-E.
013	Dark brown/black sandy silt basal shell-rich layer underlying C011 and overlying C014 in C-D.
014	Dark brown/black sandy clayey silt old ground surface underlying C013 and overlying C016 in C-E with shell, charcoal and angular/sub-rounded stone (<10cm long) inclusions. Same as C015.
015	Dark brown/black sandy clayey silt old ground surface underlying C009 and overlying C017 in A-B with shell, charcoal and angular/sub-rounded stone (<5cm long) inclusions. Same as C014.
016	Grey brown/orangey brown inorganic sand with occasional shell and charcoal inclusions and two possible worked lithics, underlying C014 and overlying bedrock in C-E. Same as C017.
017	Grey brown/orangey brown inorganic sand with occasional shell inclusions, underlying C015 and overlying bedrock in A-B. Same as C016.

Table 3: Tràigh na Beirigh 2011 drawing list

Drawing number	Section/plan	Scale	Description
1	Section	1:10	Eroding section from A-B
2	Plan	1:10	Sketch plan of bottomed test-pit 1
3	Plan	1:10	Sketch plan of bottomed test-pit 2
4	Section	1:10	Eroding section from D-E
5	Section	1:10	Eroding section C-D

Table 4: Small finds from Tràigh na Beirigh 2011

Small find number	Context number	Material	Description
1	008	Quartz	Struck quartz lithic
2	008	Stone	Stone with possible hammer marks
3	014	Stone	Stone with possible hammer marks
4	016	?	Possible worked lithic
5	016	Quartz	Quartz

Table 5: Sample list from Tràigh na Beirigh 2011

Sample number	Context number	Sample type	Volume (litre)
2	002	Bulk sample	2.0
3	004	Bulk sample	7.0
4	005	Bulk sample	40.0
5	006	Bulk sample	1.0
6	008	Bulk sample	45.0
7	006	Bulk sample	5.0
8	009	Bulk sample	8.0
9	010	Bulk sample	1.0
10	012	Bulk sample	0.5
11	011	Bulk sample	2.5
12	013	Bulk sample	2.5
13	014	Bulk sample	13.5
14	015	Bulk sample	3.0
15	016	Bulk sample	36.0
16	017	Bulk sample	9.0